CEMENTITIOUS EXTERIOR SHEATHING PRODUCT WITH RIGID SUPPORT MEMBER

FIELD OF THE INVENTION

This application is a continuation of U.S. application Ser. No. 10/288,189, filed Nov. 5, 2002, now U.S. Pat. No. 7,028,436. This invention relates to exterior sheathing products which incorporate cementitious materials, and especially, fiber cement sheathing which is lighter and more resistant to cracking when fastened to the exterior walls of buildings.

BACKGROUND OF THE INVENTION

Fiber cement has been used in the United States building materials industry since the 1980's. This material is used in residential and commercial construction applications as an alternative to wood for siding, roofing, backer board, trim and fascia applications. Fiber cement is fire and insect resistant, and is more durable. In fact, it was the fastest growing market segment in the exterior sheathing industry in the 1990's, and by 2005, this material is expected to gain up to 25 percent of the siding market.

Fiber cement is, technically, a composite of portland cement, aggregate (usually sand), and cellulose fibers. Cellulose fibers are added to cement to increase its toughness and crack-arresting ability. Fiber cement shingle and shake products are widely available from such sources as James Hardie, Inc. under the brand name Hardiplank® and CertainTeed Corporation under the brand name Weatherboards™. These products are produced by the Hatchek de-watering process, which results in a laminated flat sheet reinforced with a significant amount of cellulose fibers, usually about 30-35 percent by volume.

Fiber cement materials possess useful properties, but they were at one point in their history believed to be unsuitable for exterior use since they were susceptible to damage due to the effect of freeze-thaw cycles. See Harper et al., U.S. Pat. No. 4,637,860. Freeze-thaw action can cause severe deterioration to fiber cement building products. The primary cause of damage is due to the hydraulic pressures that develop as water freezes and expands in tiny fissures and pores of cementitious materials. Once these forces exceed the strength of the material, cracking occurs. During subsequent thawing, the water then moves through the cracks, expanding them further, to cause more damage when freezing occurs again.

Harper et al., U.S. Pat. No. 4,637,860, suggested that better freeze-thaw resistance could be achieved by autoclaving a cellulose fiber cement mixture with silica sand additions. These inventors also recognized that silica sand additions reduced the density of formed sheet materials to a level below that necessary to achieve sufficient strength and freeze-thaw resistance. Accordingly, the '860 patent suggested compressing the wet mixture in a press to reduce its thickness and increase its density prior to autoclaving. Such a process has been proven to be effective in increasing the interlaminar bond strength ("ILB") of fiber cement boards when pressures approaching 30 bar are used. See Wierman et al., "The Effects of Pressure on Freeze-Thaw Durability of Fiber-Reinforced Cement Board" (September, 2002).

While improvements to the processing of fiber cement sheathing have been introduced, there have been some notable disadvantages associated with fiber cement products compared to vinyl siding products. Specifically, even with cellulose fiber reinforcement, fiber cement panels and trim boards are susceptible to cracking by nails and screws, especially along their edges. Moreover, fiber cement trim boards are far heaver than their vinyl counterparts, and can be difficult to handle.

Accordingly, there is a current need in the cementitious exterior sheathing industry for a lighter weight, more crack resistance, and therefore, more durable siding and trim panel.

SUMMARY OF THE INVENTION

The present invention provides, in a first embodiment, a cementitious exterior sheathing product, including a rigid support member having a wall-facing side and an exterior-facing side. The rigid support member also includes a pair of lateral sides, a pair of longitudinal ends, and at least one nail flange disposed along one of its lateral sides. Disposed on a portion of the exterior-facing side of the rigid support member is a cementitious layer which exhibits an aesthetic appearance.

The cementitious exterior sheathing products and fiber cement trim boards of this invention can be provided in reduced thicknesses, of about 0.31 in., for example, which would be significantly lighter, and easier to carry than the 1 inch thickness trim boards currently provided in the marketplace. By transferring the load to a rigid support member, the cementitious trim boards of this invention can be made as much as 50% lighter than currently available fiber cement trim boards. The rigid support members of this invention are preferably provided with fastener receiving holes so that they, and not the fiber cement material, absorb the stress of hammering.

The preferred rigid support members of this invention include resinous or metallic materials which act as a reinforcement to the cementitious layers. These materials, while rigid and possessing a greater flexural modulus than fiber cement, can, nevertheless, be pre-perforated, perforated by the fasteners used to hang the trim boards, or provided as a lath structure, to enable nail or screw fastening with minimal stress, as well as, provide mechanical locking or bonding between the cementitious material and the rigid support. Additionally, cement bond promoters, such as polyvinyl-acetate ("PVA") and acrylic coatings, may be used to provide an adhesive bond between the cementitious layers and the rigid support members of this invention.

In a further embodiment of this invention, a fiber cement trim board is provided which includes an elongated rigid support member having a wall-facing side and an exterior-facing side, a pair of lateral side portions and a pair of longitudinal ends. The exterior-facing side of the rigid support member includes at least a first and a second exterior wall portion. Disposed along a first of the pair of lateral side portions of the rigid support member is a first nailing flange, and a fiber cement layer is disposed on a portion of the exterior-facing side of the rigid support member. The fiber cement layer exhibits an aesthetic appearance. In the preferred embodiment, the fiber cement layer is a corner trim board.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate preferred embodiments of the invention, as well as other information pertinent to the disclosure, in which:

FIG. **1**: is a front perspective view of a corner trim board of this invention;

FIG. **2**: is a diagrammatic, partial view of a manufacturing technique, including the de-watering of a plurality of cementitious layers;